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THE USE OF ULTRA-FINE FIBER FILTER CLOTH FOR REMOVING BACTERIAL CONTAMINANTS FROM THE AIR

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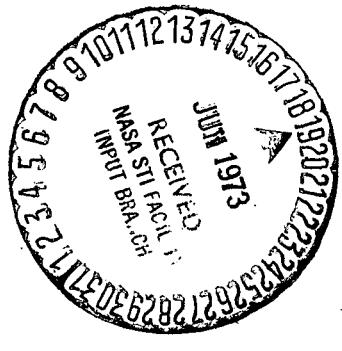

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16. Abstract

A Russian domestically produced cloth of ultra-fine fibers with a fiber diameter of 0.5-1 micron is an effective filter material for gnotobiology and other scientific projects where bacterial contaminants must be removed from the air. A test of the cloth is described.

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THE USE OF ULTRA-FINE FIBER FILTER CLOTH FOR REMOVING BACTERIAL CONTAMINANTS FROM THE AIR

G. I. Podoprigora and M. M. Intizarov†

Different filter materials intended for purifying the air of /130* microbic contaminants are widely used in different areas of experimental studies and in the practical work of bacteriological laboratories. The requirements as regards quality and properties of filter materials are especially high in gnotobiotic technology in order to provide sterile conditions for germ-free animals (Luckey, 1963). Standard filters (Fg-50; Fiberglass Company in Toledo, Ohio, Nr. F. M. 004-1/2) have been most extensively used in equipment for raising germ-free animals. However, the unavailability of the above-mentioned material led us to seek native analogs which would answer all the requirements of gnotobiotic technology. The basic requirements are a high efficiency in removing microbes from the air entering the isolation chamber and resistance to the effect of the comparatively high temperatures incurred in the process of /131 sterilizing the filter itself. Autoclaving at 123° or treatment with dry heat at 160° for two hours (Wescott and Cardner, 1962) are used for complete sterilization of the filters. The Petryanov filter cloth we used earlier—FPP and FPA—does not completely satisfy these requirements, since the first is not at all resistant to heat treatment and the second, although it withstands treatment with dry heat, changes with vapor treatment in the autoclave. The ultra-fine fiber cloth which we used as a filter material completely satisfied all the above-mentioned requirements. This material retained its properties after repeated autoclaving and treatment with dry heat.

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*Numbers in righthand margin indicate pagination of foreign text.

The following investigation was conducted in order to test the filtering capacity of ultra-fine fiber cloth. A Bunsen flask with a liquid thioglycolate medium was set up, the wide opening of the flask was covered with a layer of filtering ultra-fine fiber 2 cm in thickness and one layer of gauze, and the narrow opening with a layer of ultra-fine fiber 0.5 cm thick; the walls of the flask and the filter fiber were hermetically sealed with heat-resistant adhesive tape; this system was autoclaved at 121° for 20 minutes, then a flexible pipe connected to the ventilator of a pre-evacuation electric pump with the heating switched off was attached to the wide opening of the Bunsen flask covered with ultra-fine fiber, the pre-evacuation pump and the flask were put in an incubator and the pump motor was turned on for three days. After three days of blowing air the motor was switched off, but the incubation in the incubator lasted for 10-12 more days and the result was checked after this.

No growth of any micro-organisms capable of being cultivated in a liquid thioglycolate medium was observed. These results show that domestically produced cloth of ultra-fine fibers with a fiber diameter of 0.5-1 micron, manufactured by the experimental factory of the All Union Scientific Research Institute of Glass Plastics and Glass Fibers, is an effective filter material for the purposes of gnotobiology and other scientific projects where it is necessary to remove bacterial contaminants from the air.